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山西榆社晚中新世竹鼠一新种

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关键词　山西榆社　晚第三纪　竹鼠科

内　容　提　要

本文描述了采自山西榆社盆地上第三系竹鼠类化石的一新种。新种与 *Rhizomys* (*Brachyrhizomys*) *shansius* 相似，但个体较小，臼齿相对狭长，M_3 保留有连接下次尖和下次脊的齿棱（mure）及短的下中脊。这两种化石竹鼠在榆社的出现，超越了现生竹鼠类分布的北界，说明该科的情况要比以前知道的更为复杂，也表明榆社地区在晚第三纪时比近代湿润。

近年对华北山西省榆社盆地晚第三纪沉积物进行了系统的地质研究，根据这些研究，邱占祥等发表了论述三趾马和榆社地层的专著(见 Qiu et al., 1987)。此后，一个主要由中国科学院古脊椎动物与古人类研究所、榆社古生物博物馆和美国自然历史博物馆组成的中-美考察队，又调查了榆社西部云簇盆地的地层和化石。两次的野外考察积累了新的生物地层资料，这些成果已由邱占祥和戴德福最先开始了报道（见 Qiu et Tedford, 1990)。

中-美考察队于 1991 年 9 月对榆社盆地的沉积物进行了第三次调查。参加的成员有戴德福博士、邱铸鼎、王太明、W. 唐斯、叶捷、陈冠芳、李亦征、董颜及作者本人。这次考察了章河东岸、从榆社县城至郝北间 15 公里的上第三系露头。榆社城南二至三公里的贾峪村附近，是含化石颇丰富的地点。该村东南 0.6 公里处的 YS 156 地点，除产小哺乳动物化石 *Ochotona*, *Alilepus* 和 *Prosiphneus* 外，还有蛇类、龟鳖类、鸟类、*Hipparion* *Chilotherium*, *Cervoceras* 和 *Moschus* 的化石。此外，在一片沙棘和灌木丛生的露头，还采到下面记述的一件竹鼠下颌骨。

竹鼠科 Rhizomyidae Miller & Gidley, 1918

竹鼠属 *Rhizomys* Gray, 1831

低冠竹鼠亚属 *Brachyrhizomys* Teilhard de Chardin, 1942

沙棘竹鼠(新种) *Rhizomys* (*Brachyrhizomys*) *shajius* sp. nov.

(Fig. 1 A, B)

正型标本　一具 M_{2-3} 和 M_1 齿槽及一齿根的右下颌骨（中国科学院古脊椎动物与古人类研究所标本编号：V8920)，下颌骨的冠状突、髁突、角突、门齿和腹缘破损。

模式地点　山西榆社县贾峪村东南 0.6 公里处，YS 156。

种名来由 “Shaji”，沙棘的汉语拼音。沙棘系属名为 *Pyracantha* 的一种植物，这里意示它丛生于化石地点。后缀 “us”，拉丁文—“的”或“属于”。

特征 *Rhizomys* 属中个体小的一种。咬肌脊进步，M_2 下中脊退化，但臼齿齿冠低而窄长、M_3 保留齿褛（mure）和短下中脊的原始性状。

测量 （见表 1）

表 1 山西竹鼠 *Rhizomys* (*Brachyrhizomys*) *shansius* 与沙棘竹鼠 *Rhizomys* (*Brachyrhizomys*) *shajius* 臼齿测量比较(毫米)

	M		M	
	长	宽	长	宽
R. (*B.*) *shansius*				
31.096(正型)	4.6	4.9	6.9	4.9
14.183	5.2	5.2	6.7	5.8
R. (*B.*) *shajius*	3.60	3.50	4.05	2.70

描述 标本风化，浅黄色。依 M_2 中等磨损及 M_3 处于早期磨蚀阶段看，该标本代表一成年个体。

咬肌脊上、下支于 M_1 前根下、颌骨深度之半处交会，交会处平滑而圆(图 1,B)。颏孔位于咬肌脊交会处前端之下方。M_3 下唇侧有几个营养孔。所保存的下颌支深度在 M_2 后下方为 10.2mm。

M_1 具后侧根；M_2 三根，后侧根外撇；M_3 双根，其中有一呈后侧一前中向扩张的大根。臼齿相对低冠。M_2 具四条横脊(图 1,A)：下后脊宽，并与下后尖合并；下中脊短而窄；下次脊于下中脊的正中部有一前刺；下后边脊于正中部与下次脊连接。M_2 和 M_3 的唇侧谷深达舌侧，紧压两叶间的连结；M_3 的唇侧谷内伸超越牙齿之中线。M_3 延长；其下后脊与 M_2 的相似，但下中脊较短；唇侧谷深，下次脊短；下后边脊平缓弯曲，但在牙齿的这一磨蚀阶段，它未伸达下次脊。由于 M_3 向后收缩缓慢，使下次尖的位置几乎如同下原尖的一样靠外，后边的珐琅质岛也并不太退缩。

比较 根据咬肌脊的形态(即咬肌脊的上、下支于 M_1 下前方交会，交会处圆滑)和 M_2 下中脊退化，V8920 标本被归入 *Rhizomys* 属竹鼠。西瓦立克及禄丰一些称为 *Brachyrhizomys* 的较原始竹鼠与其有所不同，它们的 M_2 保留有一较强壮的下中脊，咬肌脊靠后，且咬肌脊的下支向前腹侧伸出一短脊。然而，V8920 标本保留有 *Brachyrhizomys* 的一些特征，即臼齿狭长、M_3 具短的下中脊及连接下次尖与下次脊的齿褛。

贾峪村的这一标本被归入 *Brachyrhizomys* 亚属，因为它与 *B. shansius* 共享一些原始的性状，即臼齿低冠，M_2 具一清楚、短的下中脊及齿褛。进步的竹鼠属，如发现于巫山的 *Rhizomys* (见 Zheng, 1991)，齿冠要高得多。或许更多、更完整的材料能为新种赋予清晰的亚属特征。

R. shajius 新种是现知 *Rhizomys* 属的最小者，它不同于 *Rhizomys* (Brachyrhizomys) *shansius* 在于其臼齿不横向扩宽，M_3 保留有下次尖与下次脊间的齿褛。这些差异特征在 *R. shansius* 的已知标本中，除 14.183 标本(图 1,C)外，都稳定不变。14.183

标本 M_3 的冠基向后扩张(图中虚线示扩张的程度),这样,当牙齿进一步磨蚀时，冠面会显得更长些。

Cannomys badius 不同 *R. shajius* 在于具有一个进步的 M_2 (缺少下后边脊)。新种在尺寸上与 "*Brachyrhizomys*" *nagrii* 接近,但后者 M_3 的后叶退缩。"*Brachyrhizomys*" *nagrii* 以及个体较大的 "*Brachyrhizomys*" *tetracharax* 的 M_2 都具有一长的下中脊,它们在咬肌脊形态上也有别于 *R. shajius*。

Rhizomys (*Brachyrhizomys*) *shansius* 有采自榆社盆地的几件标本。德日进(Teilhard de Chardin, 1942) 的正型标本及归入标本都产自桃阳地区的高庄组下部，标本 14.183 发现于白海村高庄组较高层位。我们所采集的该种化石来自时代较晚的麻则沟组。所有这些含化石地层都落入吉伯特 (Gilbert) 和高斯 (Gauss) 磁性早期内，时限约在 5.7—3 百万年(见 Tedford et al., 1991)。

初步看,贾峪村附近的地层时代与马会组上部的相当。当然,更精确的年代测定有待弗罗里达大学 N. Opdyke 对磁性样品的测定和解释。现在看来，YS 156 地点的时代可能相当于晚第五正向极性时 (late Chron 5)，属晚中新世，绝对年龄要超过 5.7 百万年。因此，新种 *Rhizomys* (*Brachyrhizomys*) *shajius* 似乎要先于 *R. shansius* 的早期代表。

值得注意的是，在榆社盆地发现了 *Rhizomys* 属的两个化石种，它们代表竹鼠科迄今所知的最北记录(见 *Flynn*, 1990)。它们的出现与榆社获得的其他证据完全一致，表明了晚中新世及早上新世时,该盆地没有现代那样干燥。

邱铸鼎和 *W*. 唐斯为本文的研究作了有益的工作,作者在此表示感谢。

(邱铸鼎译)

A NEW BAMBOO RAT FROM THE LATE MIOCENE OF YUSHE BASIN

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Key words Rhizomyidae; new species; late Neogene; Yushe Basin

Abstract

A new species of rhizomyid rodent is described from late Neogene deposits of Yushe Basin, Shanxi Province. It resembles *Rhizomys* (*Brachyrhizomys*) shansius, but differs in its smaller and proportionally narrower molars, and retention of a mure and short mesolophid on M_3. That two bamboo rats occurred in the late Neogene of this region, beyond the northern limit of present distribution for the family, indicates greater diversity than previously known and moister conditions than at present.

Introduction

Recent systematic and geological research in the late Neogene deposits of Yushe Basin, Shanxi Province, northern China, has resulted in a monograph on the hipparionines and stratigraphy of the area (Qiu et al., 1987). Since then, a Chinese-American team representing mainly the Institute of Vertebrate Paleontology and Paleoanthropology, the Yushe Museum of Paleontology, and the American Museum of Natural History, has been investigating the rocks and faunas of the Yunzhu subbasin, west of Yushe. Two field parties accumulated new biostratigraphic information, publication of which began with Qiu and Tedford (1990). Microfaunas were reported in part by Wu and Flynn (1992) and Flynn et al. (1991). The author thanks Qiu Zhuding and Will Downs for helpful comments on this note.

The third IVPP-AMNH expedition to Yushe Basin investigated Yushe subbasin deposits south of Yushe in September of 1991. A field party including Dr. R. H. Tedford, Qiu Zhuding, Wang Taiming, Will Downs, Ye Jie, Chen Guanfang, Li Yizheng, Dong Wei and the author explored late Neogene exposures along the east bank of the Zhang River between Yushe and Haobei, 15 km to the south. Some of the most productive sites are 2 to 3 km south of Yushe, near Jiayucun. Our locality YS 156, 0.6 km southeast of Jiayucun, produced snake, turtle, bird, *Hipparion*, *Chilotherium*, *Cervoceras*, and *Moschus* remains, as well as micromammals *Ochotona*, *Alilepus*, and *Prosiphneus*. In addition, a small exposure nearly overcome by firethorn (*Pyracantha*) and other shrubs, which grow so prolifically through the National Aforestation Program, yielded the bamboo rat jaw described below.

Family Rhizomyidae Miller and Gidley, 1918
Genus *Rhizomys* Gray, 1831
Subgenus *Brachyrhizomys* Teilhard de Chardin, 1942
Rhizomys (*Brachyrhizomys*) *shajius*, sp. nov.

Holotype V8920, right dentary fragment with M_{2-3} and alveoli and one root of M_1; lacks coronoid, condyle, angle, incisor, and ventromedial margin of jaw; only known specimen.

Type locality YS 156, Yushe subbasin, 0.6 km southeast of Jiayucun. Deposits correlative to the upper part of the Mahui Formation, about 5.7 million years old.

Etymology Form the Chinese "shaji" (generic name for *Pyracantha*, the plant that is consuming the fossiliferous exposures of Yushe Basin, in reference to conditions at the locality), plus "-us", Latin for "of" or "pertaining to".

Diagnosis Small *Rhizomys*, with derived masseteric crest and reduced mesolophid on M_2, but primitive in narrowness and low crown height of molars, and retention of a mure and short mesolophid on M_3.

Description V8920 is a weathered, buff colored specimen representing an adult, judging from the moderate wear on M_2 and earlier wear on M_3. There is a smooth, rounded conjunction of the lower and upper masseteric crests below the anterior root of M_1, about midlevel on the dentary (Figure 1B). The mental foramen is below and anterior to this point. Several nutritive foramina are preserved posterolateral to M_3. Preserved dentary depth below the posterior part of M_2 is 10.2mm. The posterolateral root of M_1 is present, M_2 has three roots, the posterolateral one splayed outward, and M_3 has two roots, including one large root flattened on a posterolateral-anteromedial axis. Molars are relatively low crowned. M_2 has four transverse crests (Figure 1A): the metalophid incorporates a large metaconid and is broad; the mesolophid is short and narrow; the hypolophid has an anterior spur medial to the mesolophid; the posterolophid joins the hypolophid medially. The labial reentrants of M_2 and M_3 reach deep lingually, constricting connections between lophs; that of M_3 extends beyond the midline of the tooth. M_3 is elongated. Its metalophid resembles that of M_2, the mesolophid is shorter, the hypolophid is short due to deepness of the labial reentrant, and the posterolophid curves gently but does not reach the hypolophid at this stage of wear. Because the

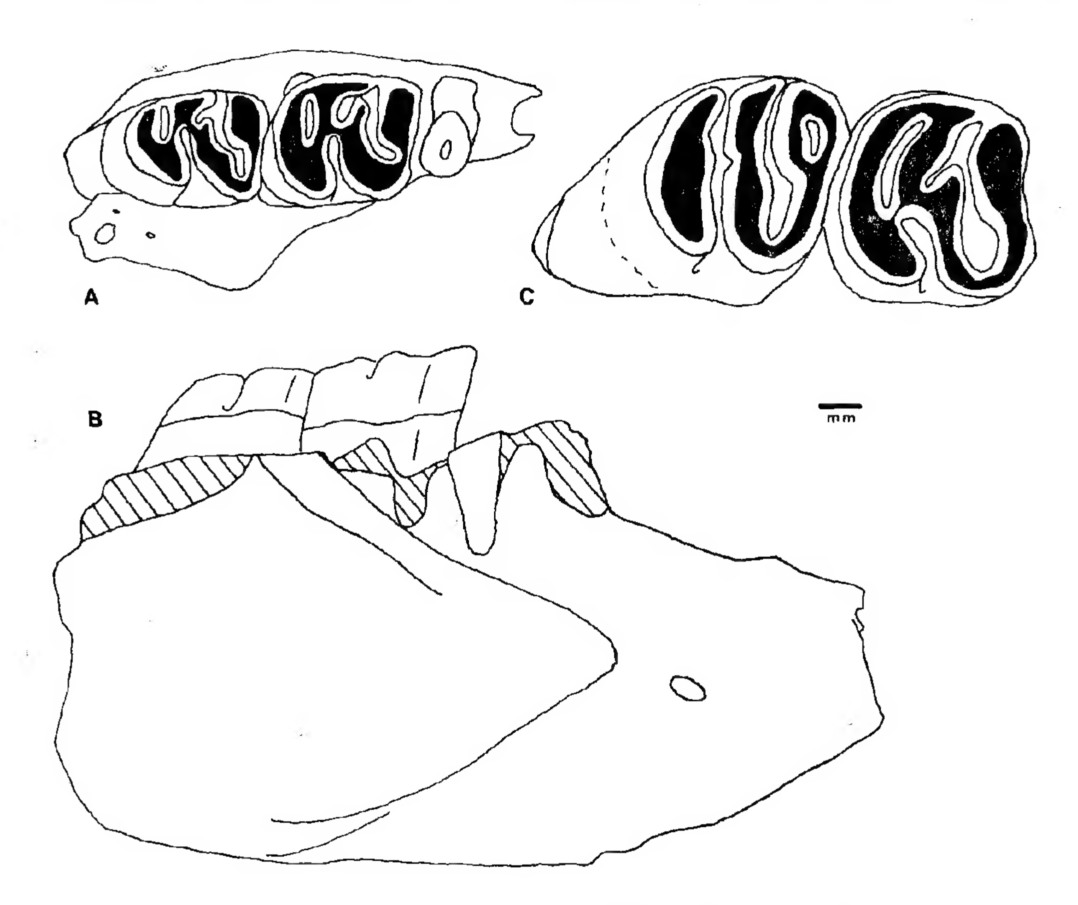


Fig. 1. Occlusal (A) and lateral (B) views of V8920, right dentary fragment of *Rhizomys* (*Brachyrhizomys*) *shajius* sp. nov.; occlusal view (C) of right M/2—3 of 14.183, *Rhizomys* (*Brachyrhizomys*) *shansius*, drawn to same scale.

tooth is not sharply tapered posteriorly, the hypoconid is nearly as lateral as the protoconid and the posterior enamel lake is not greatly reduced.

Comparisons V8920 represents the bamboo rat group *Rhizomys* based on morphology of the masseteric crest (rounded confluence of upper and lower portions below the front of M_1) and the reduced mesolophid on M_2. Older rhizomyines from the Siwaliks and Lufeng under the name "*Brachyrhizomys*" differ at the generic level (Flynn, 1990): typically they retain a stronger mesolophid on M_2 and more posterior masseteric crest, usually with short anteroventral continuation of the lower portion of the crest. V8920 retains "*Brachyrhizomys*" features of elongated molars and M_3 with small mesolophid and connection (mure) of the hypoconid to the base of the hypolophid.

The Jiayucun specimen V8920 is placed in the subgenus *Brachyrhizomys* on primitive features shared with *B. shansius*, namely low crown height and presence of a distinct, short mesolophid (and mure) on M_2. Advanced *Rhizomys*, e. g. that of wushan (Zheng, 1991) is much higher crowned. Better material would possibly enable characterization of a distinct subgenus for this new species.

R. shajius sp. nov. is the smallest known *Rhizomys* and differs from *Rhizomys* (*Brachyrhizomys*) *shansius* (Figure 1C) in that its molars are not transversely broadened and the last molar is not modified by loss of the mure and mesolophid. These differences are constant in all known *R. shansius*, but one specimen (14.183, Figure 1C) shows that the base of the crown of its M_3 expands posteriorly (dashed curve on figure), such that the occlusal surface would be longer in advanced wear.

As for further comparisons, *R. shajius* does not have the derived M_2 (lacking posterolophid) of *Cannomys badius*. The new species is about the size of "*Brachyrhizomys*" *nagrii*, but the latter has a shortened posterior lobe on M_3. "*Brachyrhizomys*" *nagrii* and the larger "*Brachyrhizomys*" *tetracharax* both differ from *R. shajius* in masseteric crest morphology and in having a long mesolophid on M_2.

Rhizomys (*Brachyrhizomys*) *shansius* is known from several specimens from Yushe Basin. The holotype and referred specimens of Teilhard de Chardin (1942) are from the Taoyang area, low in the Gaozhuang Formation. The specimen 14.183 is from Baihaicun, higher in the Gaozhuang Formation. We have recovered remains of the species from the younger Mazegou Formation. All of these finds are constrained to the Gilbert and early Gauss magnetic chrons, an interval of

Table 1. Comparison of molar dimensions for *Rhizomys* (*Brachyrhizomys*) *shansius* and *Rhizomys* (*Brachyrhizomys*) *shajius* sp. nov. (mm).

	M/2		M/3	
	Length	Width	Length	Width
R. (*B.*) *shansius*				
31.096 (type)	4.6	4.9	6.9	4.9
14.183	5.2	5.2	6.7	5.8
R. (*B.*) *shajius*				
V8920	3.60	3.50	4.05	2.70

approximately 5.7 to 3 Ma (see stratigraphy of Tedford et al., 1991). Initial chronostratigraphic correlation of the rocks around Jiayucun suggests that they correspond to the upper part of the Mahui Formation. More precise age determination awaits further paleomagnetic sample analysis by Neil Opdyke, University of Florida. At present, it seems that locality YS 156 correlates to late Chron 5, late Miocene, in excess of 5.7 Ma, and that ***Rhizomys* (*Brachyrhizomys*) *shajius*** likely preceded early representatives of ***R. shansius***.

Recognition that two species of ***Rhizomys*** occurred in Yushe Basin is noteworthy because they constitute the northernmost records of the family for any time in the past (see Flynn, 1990). Their records in Yushe Basin agree with other evidence that this inland habitat was less dry in the late Miocene and early pliocene than at present.

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